ALGEBRA.

173. Proposed by JOHN M. COLAW. A. M., Monterey, Va.

Solve $\sqrt{(a+x+y)}=x$.....(1), $\sqrt{(b+y+z)}=x$.....(2), $\sqrt{(c+z+x)}=x$.....(3).

Solution by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University, Cal.

From (2), (3), and (1), we have

$$x^2-y-z=b\text{.....}(4),$$
$$y^2-z-x=c\text{.....}(5),$$
$$z^2-x-y=a\text{.....}(6).$$

From (4) and (5); from (5) and (6); from (6) and (4), we have

$$(x-y)(x+y+1)=b-c\text{.....}(7),$$
$$(y-z)(y+z+1)=c-a\text{.....}(8),$$
$$(z-x)(z+x+1)=a-b\text{.....}(9).$$

By addition of corresponding members of (7), (8), (9), we get

$$(x-y)(x+y+1)+(y-z)(y+z+1)+(z-x)(z+x+1)=0\text{.....}(10).$$

It is easy to see that either $x=y=z$....(11),
or $x+y+1=y+z+1=z+x+1=0$.....(12),

will satisfy (10). From (11), (4), (5), (6), we find

$$x=y=z=1\pm\sqrt{(b+1)},\ 1\pm\sqrt{(c+1)},\ 1\pm\sqrt{(a+1)}.$$

From (4), (5), (6), (12), we obtain

$$x=\pm\sqrt{(b-1)},\ y=\pm\sqrt{(c-1)},\ z=\pm\sqrt{(a-1)}.$$

Also solved by *MARCUS BAKER*, and *G. B. M. ZERR*.

174. Proposed by HARRY S. VANDIVER, Bala, Pa.

If the quantity x be expressed in the form of a continued fraction P_n/Q_n denoting the $(n+1)$th convergent, with x_n the corresponding complete quotient, then $\dfrac{P_{n-(k-1)}-Q_{n-(k+1}x}{P_n-Q_nx}=(-1)^{k+1}x_n\times x_{n-1}\text{.....}x_{n-k}$.

Solution by G. B. M. ZERR, A. M., Ph.D., The Temple College, Philadelphia, Pa., and J. E. SANDERS, Hackney, Ohio.

$$x=\frac{x_nP_n+P_{n-1}}{x_nQ_n+Q_{n-1}} \text{ or } x_n=\frac{xQ_{n-1}-P_{n-1}}{P_n-xQ_n}.$$